

Attachment 1 - Staff Report
Update on Temporary Water Right Permits for Underground Storage
December 6, 2016

Overview

The ongoing statewide drought and implementation of the Sustainable Groundwater Management Act have triggered increased interest in capturing high surface water flows and storing the water in groundwater basins (i.e., groundwater recharge or underground storage) for later use. Because these projects often require a new appropriative water right, the Governor and the State Water Resources Control Board (Board) have taken multiple steps to encourage recharge projects for drought recovery and facilitate temporary water right permitting for these projects.

The Division issued two temporary permits for recharge projects in Water Year 15/16, and the experience raised program-level questions about how to apply permitting requirements to different types of underground storage projects. This report includes:

- Summaries of the two projects and associated outcomes; and
- Four program-level questions and associated recommendations related to underground storage permitting processes.

Background on Temporary Permits for Underground Storage

[Temporary permits](#) can authorize temporary diversion and beneficial use of water when there is an urgent need for the water. Unless renewed, a temporary permit automatically expires 180 days after the date of issuance.¹ Issuing a temporary permit generally takes less time and review than issuing a standard permit because of streamlined statutory requirements and the temporary nature of the authorization.

On November 13, 2015, Governor Edmund G. Brown, Jr. signed [Executive Order B-36-15](#). Executive Order B-36-15:

- Directed the State Water Resources Control Board (Board) to prioritize temporary water right permits for projects that enhance the ability of a local or state agency to capture high precipitation events in the winter and spring for local storage or recharge and later beneficial uses; and
- Suspended the provisions of the California Environmental Quality Act for these temporary permits.

In early 2016, the Division of Water Rights (Division) issued [two temporary permits](#) for underground storage under the Executive Order: T032564 of Scott Valley Irrigation District (SVID) and T032581 of [Yolo County Flood Control and Water Conservation District](#) (YCFC). SVID and YCFC recently submitted [summary reports](#), detailing:

- The total amount of water diverted under the temporary permits;
- The total amount of water put to beneficial use under the temporary permits; and
- Other information necessary to document compliance with the temporary permit terms.

¹ The 180-day period is a limitation on the authorization to divert, and not a limitation on the authorization for beneficial use of stored water, including water diverted to underground storage.

The two projects and summary report results are described below.

Project Descriptions and Outcomes

Scott Valley Irrigation District

Project Objectives

SVID diverted water from the Scott River, tributary to the Klamath River during the winter months. The diverted water infiltrated through unlined irrigation ditches and agricultural fields to underground storage near the Scott River channel. The objectives were to:

- Augment stream flow in the spring and summer for fish and wildlife enhancement; and
- Improve and expand surface water-groundwater connections.

Project Description

Under the temporary permit, SVID was authorized to divert up to 5,400 acre-feet of water at a maximum rate of 30 cubic feet per second (cfs) from January 1 to March 31. Water was diverted at an existing diversion facility associated with SVID's License 441 (Application 512) and directed into the 13.2-mile unlined ditch by which SVID delivers water to customers.

Landowners opened existing flood valves connected to the ditch to flood their fields.

Percolation occurred in both the unlined ditch and nearby agricultural fields. Permit requirements included a minimum bypass flow on the Scott River to protect fish and wildlife and other legal water users consistent with the [1980 Scott River Decree No. 30662](#).

Project Outcomes

According to SVID's summary report, Scott Valley received above-average precipitation in WY 15/16. As a result, some farmers were reluctant to apply more water on their fields and risk flooding, and SVID's diversions were limited by available infiltration capacity. SVID diverted approximately 680 acre-feet (approximately 13% of the authorized permit amount) for percolation in the ditch and on five fields. To measure the response in the groundwater basin, eight groundwater wells on the east side of the Scott River were equipped with pressure transducers to monitor changes in groundwater levels in response to the artificial and natural recharge. Based on data from the wells, the groundwater table rose approximately 4.5 feet near the recharge site.

The increase in spring baseflow in the Scott River resulting from the project was too small to measure; instead, SVID estimated augmented baseflow using a model created by UC Davis. According to the model, approximately 45 acre-feet (approximately 7% of the diverted water) of the artificial recharge returned to the Scott River between April and July. Dr. Thomas Harter (UC Davis), who was involved in the SVID project, later clarified that, in his professional opinion, all 680 acre-feet of stored water will eventually return to the river. Only partial beneficial use was demonstrated under the temporary permit during the authorized permit period, illustrating the need to consider long-term reporting requirements.

Yolo County Flood Control and Water Conservation District

Project Objectives

Under YCFC's project, water was diverted from Cache Creek, tributary to the Yolo Bypass thence the Sacramento River, to underground storage through the district's unlined irrigation canals to spur short-term drought recovery in the underlying basins. Reduced surface water deliveries to YCFC's customers over the past four years due to drought had resulted in

increased pumping from the underlying Yolo and Colusa sub-basins,² drawing down the average water table depth to the lowest levels since 1978. Declines of more than ten feet were observed from 2014 to 2015, and the water table in certain areas had dropped below the reach of some wells. The project also allowed YCFC to evaluate the feasibility of future recharge activities.

Project Description

YCFC was authorized to divert up to 40,000 acre-feet of water at a maximum rate of 200 cfs from January 1 to April 30. Water was diverted at YCFC's existing Capay Diversion Dam in Yolo County. Water then infiltrated into the Yolo and Colusa sub-basins via YCFC's 160-mile canal system, most of which is unlined. Stored water was later extracted by well-owners overlying the sub-basins for irrigation use within the YCFC service area. YCFC bypassed peak, sediment-laden flows, as small sediments could reduce percolation rates within the canal system. The temporary permit included a bypass term to protect downstream users and fish and wildlife.

Project Outcomes

YCFC diverted approximately 11,128 acre-feet of water (approximately 28% of the authorized permit amount) to underground storage under the temporary permit, largely in March and early April. YCFC estimated the volume of water applied to beneficial use based on the average drop in groundwater levels during the irrigation season; groundwater levels were measured at nine monitoring wells distributed throughout the YCFC service area. This approach assumes the first water extracted by users within the service area of the district was "permit" water. According to this method, approximately 13,072 acre-feet of water were extracted for irrigation between April 16 and May 12, more than exhausting the 11,128 acre-feet diverted to storage.

Program-Level Questions and Associated Recommendations

The following section identifies four program-level questions and associated recommendations. Recommendations include solutions proposed by SVID or YCFC during the permitting process and compliance review, stakeholder feedback, and staff analysis and research. [Stakeholder feedback](#) was obtained from a [public workshop](#) held in Sacramento on April 26, 2016. The purpose of the public workshop was to:

- Share Division staff experiences processing the two applications;
- Gather stakeholder input on the permitting process; and
- Solicit written and verbal suggestions for developing a new fee structure.

How should permittees account for beneficial use?

Description of the Problem

One of the topics raised for discussion at the April workshop was the issue of accurately accounting for beneficial use of stored water. Water right appropriations must be for some beneficial use, such as domestic, irrigation, or municipal uses, or fish and wildlife enhancement. (Wat. Code §1240; Cal. Code Regs., tit. 23, § 659 et seq.) Maintaining an appropriative right requires beneficial use of the water: if beneficial use of the water ceases, the right ceases.

² The Yolo sub-basin has been designated a high-priority basin by the Department of Water Resources (DWR) because of the total number of wells, the high proportion of land used for irrigated agriculture, and high reliance on groundwater in the area. The Colusa sub-basin has been designated as a medium-priority basin; it also supports a high proportion of land used for irrigated agriculture, but the region has fewer wells and is less reliant on groundwater overall.

Acquiring sufficient data and monitoring capabilities to accurately describe the amount of water successfully placed into storage, storage losses, and the amount of water extracted and used is challenging for some storage projects. Data gaps may include:

- Percolation rates for the recharge area(s);
- Storage losses in the subject basin(s), such as underground outflows to an adjacent groundwater basin, discharge to interconnected streams as baseflow, or evapotranspiration from the upper aquifer; and
- Measurement of withdrawal of stored water, particularly from unmetered private wells.

In some cases, the amount of water applied to beneficial use cannot be directly measured, such as recharged water returning to a stream as baseflow at a later time.

Accurate accounting and reporting is necessary to ensure water is put to the beneficial use for which it was allocated, prevent injury to other users of water and, in the case of underground storage, prevent overdraft of the basin. For projects proposing to store water in groundwater basins for longer periods of time (multiple years), the issues described above could lead to an inaccurate understanding of how much water remains stored and available for use under the permit and within the basin as a whole.

Groundwater basins often experience some level of natural outflow over time. Surface water storage activities may increase groundwater outflows. If, for example, a basin loses ten percent of its stored water every year, the amount of water stored in the basin under a permit should address the ten percent annual loss. If the permit does not address losses, the permittee could extract water from the basin under the priority of the surface water right, even after water stored by the permittee has been exhausted. Depending on how a basin is managed, injury to other legal users and overdraft of the basin could result. The problem would become more pronounced the longer water is kept in storage.

Permittee Solutions and Stakeholder Recommendations

Where extraction for beneficial use cannot be directly measured, beneficial use can sometimes be accounted for indirectly. YCFC assumed no losses and used monitoring well data to estimate overall changes in water table levels within the YCFC boundaries at the beginning of the irrigation season to determine when all of the stored water had been put to beneficial use. YCFC had no plans to store the water for later years. SVID relied on output from an integrated surface water-groundwater hydrologic model previously developed for the Scott Valley. SVID also monitored the nearest downstream streamflow gage on the Scott River, however, the amount of water diverted and stored by SVID was too small to produce observable increases in flow at the gage.³

The question of accounting for beneficial use for these permits was put to the public at the April 26th staff workshop. Dr. Harter noted that the resolution of the modelling or water table monitoring would need to be considered, i.e., whether beneficial use must be demonstrated at a very local scale, or could be expanded to the scale of an entire basin or sub-basin. [Jack Rice \(California Farm Bureau Federation\) recommended](#) making a more general finding that all water from a given basin, including water from artificial recharge projects, is eventually put towards some beneficial use. [John Lambie \(E-PUR\) raised](#) the possibility of using crop duties or other water consumption estimates for the purposes of temporary permits, subtracting out any surface

³ According to modelling results, SVID would have needed to divert to underground storage approximately 7,500 acre-feet to produce observable late-summer increases in streamflow at the downstream USGS gage near Fort Jones.

water deliveries made for the particular beneficial use. Independently of the workshop, groundwater researchers from UC Davis encouraged the Division to accept the use of broad, basin-scale water budgets to estimate beneficial use under permits for underground storage.

Staff Recommendations

Some of the data gaps at the source of the problem should be addressed once the [Sustainable Groundwater Management Act \(SGMA\)](#) is more fully implemented. Passed in 2014, SGMA requires local [Groundwater Sustainability Agencies](#) (GSAs) to manage groundwater basins to avoid undesirable results. GSAs are required to develop Groundwater Sustainability Plans (GSPs) by 2020 for basins in a state of critical overdraft, and 2022 for all other medium- and high-priority basins.

Development of the GSPs under SGMA will likely improve information related to inflows, outflows, and existing beneficial uses in medium- and high-priority basins. GSPs will be required to include a hydrogeologic conceptual model of the basin, characterizing the physical components and interaction of surface water and groundwater systems in the basin and, among other things, identifying potential recharge areas. (Cal. Code Regs., tit. 23, § 354.14.) The GSPs will also detail a water budget that quantifies outflows from the groundwater system, including losses (e.g., evapotranspiration, groundwater discharge to surface water sources, and subsurface groundwater outflow). (*Id.*, § 354.18, subd. (b)(3).)

Some basins may turn to artificial recharge as one management action to achieve sustainability goals. GSAs could prepare for recharge proposals and permitting requirements by proposing defensible methods to account for diversions to underground storage, withdrawals and losses. Methods could incorporate the groundwater flow models or monitoring well networks required as part of developing and implementing a GSP.

Before the GSPs come into effect, requirements for monitoring and accounting might vary depending on the size, duration, and purpose of the project. A more general demonstration of beneficial use for short-term pilot projects under temporary permits such as the SVID and YCFC projects, in which the proposed beneficial use is within the same water year, presents fewer risks of injury to other legal users and compounding accounting problems over time. This approach is also consistent with the interest and benefit in demonstrating the feasibility of recharge projects that use available high water flows, as specified in Executive Order B-36-15. In contrast, long-term storage projects planning to bank water for multiple years will need to provide more detailed information on hydrogeologic information to understand available long-term storage capacity in the aquifer, water movement and basin losses, and impacts to other basin users. Integration with SGMA processes may be appropriate for long-term storage projects where the necessary detailed technical information will become available through GSP development and implementation.

How can beneficial use be tracked for recharge rights issued to water purveyors?

Description of the Problem

Some accounting approaches for beneficial use can be problematic if the party diverting the water is not the party putting the water to beneficial use. As in YCFC's case, a district or GSA may apply for a temporary or standard recharge permit for withdrawal and use by customers with private wells. Customers or other individuals located within the District's place of use with private wells may already pump water using an overlying groundwater right. In some cases, pumpers may want to continue to use water under their groundwater rights rather than another

party's surface water right (e.g., to defend against a claim of prescription, in preparation for adjudication of the basin, or as part of negotiations during development of a GSP).

Applicants who are not beneficial users need to clarify how they will confirm water reported as "used" by third parties under their permit was not used or reported under a different claim of right. Double-counting the beneficially used water, particularly under a standard permit, can complicate management of a basin and future adjudications.

Depending on the situation, some accounting methodologies may be too low-resolution to track pumping and beneficial use under different bases of right. Proponents of pilot projects may not have the resources or time to implement complex monitoring strategies. However, use of basin-scale modelling or data from existing monitoring wells may only be able to describe overall pumping in an area. At broader scales, separating out pumping under a single permit from all local pumping could be difficult.

Permittee Solution and Stakeholder Recommendations

To address the basis of right issue, Division staff suggested that YCFC establish agreements with individual well operators. Instead, YCFC adopted a resolution. The YCFC Board of Directors passed Resolution 16.04, allowing YCFC customers to use the water stored under the temporary permit prior to using their overlying groundwater rights. For reporting purposes, YCFC then assumed all water pumped at the beginning of the irrigation season was put to use under the temporary permit.

At the April 26th staff workshop, [John Lambie recommended](#) that, for long-term projects, the appropriator be responsible for tracking the amounts of water used by different parties under a permit, but he added this provision would be difficult to implement before SGMA comes into effect. [Jack Rice suggested](#) the Board distinguish between "groundwater recharge" and "groundwater banking," and treat groundwater recharge as a process where surface water subject to regulation by the Board becomes groundwater, practically and legally.⁴

Staff Recommendations

The Division's approach could depend on the size, duration, and purpose of the project. While the Division staff preferred the use of agreements between the well-owner and the permittee, the Division determined YCFC's approach was acceptable for their particular situation, where the well-owners are customers of the District, the project involved full beneficial use of the water shortly after diversion, and the permit is temporary.

In the future, the Division may require more explicit agreements with users of the water. The agreements should be adequate to confirm that any water counted as "used" under the permit is not double-counted under another right. SGMA activities may also clarify water use under different rights: if a GSP requires individual use reporting from basin pumpers, the GSA might maintain "accounts" of pumpers' use under various rights.

How can the Division quickly determine water availability for temporary permits?

Description of the Problem

Before issuing a temporary permit, the Division must review available information on relevant water rights decisions, water availability and downstream users and determine whether the water may be diverted and used without injury to any lawful user of water. (Water Code, §1425.)

⁴ This change would require legislation.

This finding is often easier to make for projects proposing to divert only during very high flows. Very high flows, or “flood flows,” occur less frequently but may be sufficiently high that all existing rights in the watershed are satisfied and water remains available to be appropriated pursuant to a temporary permit. Executive Order B-36-15 expedited approval of temporary permits specifically for capture of high precipitation events, though it does not define “high precipitation event.”

There is no legal distinction between normal flows and flood flows for the purpose of water rights, making it difficult for Division staff to quickly identify a flow above which a new diversion would not injure other users. In some cases, particularly upstream in a river system, even very high flows may already be allocated to downstream senior users. Temporary permits may also be issued in stream systems classified as Fully Appropriated pursuant to Water Code sections 1205 through 1207, where risk of injury to other users may be higher.

To complicate matters, not all applicants seek to divert very high flows. Erosive high flows in some streams carry higher loads of fine sediments, which can seal soil pores and reduce infiltration rates in recharge areas. For these reasons, YCFC deliberately bypassed peak flows in Cache Creek. Existing diversion works and water conveyance systems may also not be designed to accommodate high winter flows in addition to runoff from the precipitation event causing the increased flows. In SVID’s case, runoff from above-average precipitation reduced the capacity of its conveyance ditch, reducing the amount of additional water the ditch could transport from the Scott River.

Permittee Solutions and Stakeholder Recommendations

SVID proposed capturing flows in the Scott River above 440 cfs, based on the flows required for fish and wildlife and water uses identified in the 1980 Scott River Decree. YCFC initially proposed a minimum bypass that would maintain instream infiltration in Cache Creek downstream of the Capay Diversion Dam, protecting downstream riparian and groundwater users. The Division ultimately required a higher, variable minimum bypass to protect downstream users in the Yolo Bypass and the Sacramento River. Because YCFC proposed to divert lower flows, staff’s analysis of water availability for the YCFC project required considerably more time than the analysis for the SVID project.

Dr. Helen Dahlke (UC Davis) proposed the 90th percentile of the hydrograph as a promising protective threshold for water availability in the Sacramento and San Joaquin river systems, based on ongoing research; however, she noted that diversion infrastructure can be a limiting factor in capturing those flows. [Jack Rice recommended](#) creating a high flow threshold to identify projects that would clearly not have impacts to downstream users or fish and wildlife; projects in this “safe zone” might require less review during the application process, encouraging more people to participate in recharge. Applicants interested in lower flows would have to provide a more robust water availability analysis.

Staff Recommendations

Given the complexity of water rights and diversity of stream systems in the state, staff has not been able to identify any universally protective thresholds that could be used to distinguish high flows or high precipitation events from other available flows. As was done with the YCFC and SVID projects, the Division can continue to evaluate projects on a case-by-case basis. Depending on the stream system, projects proposing to divert very high flows or flood flows would generally present lower risks of injury to other users and would require a less detailed analysis of water availability.

How can the Division prepare for future workload related to recharge projects?

Description of the Problem

In an attempt to encourage recharge projects for drought recovery, the Board [amended the Fiscal Year \(FY\) 15/16 water right fee schedule](#) in December 2015, to add a substantially reduced application filing fee for temporary permits to divert water from high flow events to underground storage for later beneficial uses. The reduced fee was carried through to the FY 16/17 fee schedule. Division staff also created two webpages to disseminate information on the program: [one explaining](#) the relationship between water right permitting and groundwater recharge projects, and [the second describing](#) the temporary permitting process for recharge projects in more detail.

Despite the efforts the Division has made to publicize the temporary permitting program and the attention artificial recharge has garnered during the current drought, the Division only received two applications for temporary permits for recharge in Water Year 15/16. Reasons for this may include:

- **Basin management unknowns.** Although SGMA was passed in 2014, GSPs will not be finalized until 2020 or 2022, depending on the basin. Until then, users in some basins may not want to take on the risks and costs associated with new recharge projects without more certainty of other users' pumping.
- **Project risks.** "On-farm recharge," in which agricultural fields are used as infiltration grounds for recharge outside of the growing season has been recurrent in the news during the drought, but potential impacts to crop health and water quality are still under examination. [University of California, Sustainable Conservation](#), and other parties have conducted ongoing studies and demonstration projects to better understand the potential for on-farm recharge. Results from those experiences may encourage expanded interest in on-farm recharge projects.
- **Infrastructure deficiencies.** Local entities may not have existing infrastructure for high-flow surface water diversions or monitoring devices or wells necessary to account for diversions and beneficial use.⁵

The Division has received three applications for temporary permits for recharge for the coming wet season. Two applications, from Eastside Water District and the City of Corona, were pending as of November 2, 2016, and one, also from Eastside Water District, was withdrawn. Staff also anticipates a new application from YCFC. Assuming the Division receives more applications for diversion to groundwater storage in the future, prioritization of projects may become a question. Staff anticipates interest in projects with varying objectives, including:

- Restoring supply in a basin experiencing short-term drawdown of water levels (e.g., drought recovery) as part of long-term conjunctive use;
- Restoring supply in a basin experiencing long-term overdraft;
- Improving temperature or amount of baseflow in surface streams for fish and wildlife enhancement; or
- Expanding existing water supply or replacing an existing water supply source, such as contract water.

⁵ Monitoring wells and measuring devices for diversions should become more common with implementation of SGMA and the Board's [Emergency Regulation for Measuring and Reporting Water Diversions](#).

The Division already uses a [set of criteria](#) to prioritize the processing of new water right applications and changes to existing water rights. In general, priority is given to projects of regional or statewide significance, and to projects designed to minimize or avoid impacts to the environment. Executive Order B-36-15 currently requires the Board to prioritize temporary permits for diversion and storage of high precipitation events by state and local agencies. All other applications would be subject to the Division's general criteria.

Stakeholder Recommendations

David Bolland (Association of California Water Agencies) commented at the April staff workshop that faster application processing is a substantial incentive for water rights applicants. Stacey Sullivan (Sustainable Conservation) recommended encouragement, through fees or other means, of projects that provide some nexus to achieving SGMA sustainability goals.

Staff Recommendations

Projects that support basin-wide sustainability goals outlined in a GSP may already receive priority as a project of regional significance, but the Division may revisit its priority criteria if workload associated with groundwater recharge applications increases.